Common composites shades used for restorations of mandibular molar teeth.

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Abstract

Aim: The aim of the study is to determine the Common composite shades used for restoration of mandibular molar teeth.

Introduction: Shade selection plays an important role to achieve with a good aesthetic restoration that harmoniously blends to the natural dentition. Even though the colour may not be important to the physiological success of a dental restoration, it plays a dominant role in patient acceptance. Patients are currently demanding esthetic replacement that must match their existing dentition, and are more concerned about the shade match of their restoration rather than the quality of the restoration.

Material and Method: The retrospective study was conducted in a university setting. Data was collected from the patients who visited Saveetha dental college between June 2019 to February 2021. Among 21,843 patients who had reported to the department of conservative dentistry and endodontics of Saveetha dental college, prevalence of Common composite shades used for restoration of mandibular molar teeth was calculated.

Result: It was noted that the most common age group to undergo treatment for composite restoration patients in the age group of 18-30 years (58.17%) (Figure 1).The most prevalent gender to undergo this treatment were Male (56.45%) (Figure 2). Most common treatment underwent by patients were class 1 LCR (97.89%) (Figure 3). Most prevalent teeth to be treated was Tooth number 47 (25.52%) (Figure 4). Most common shade used was A2 (81.23%) (Figure 5).

Conclusion: Within the limitations of the study, it can be concluded the prevalence of Common composite shades used for restoration of mandibular molar teeth was most commonly seen in males than females. Significant association was present between the ages, gender with shade used.

Keywords: Shade selection, Aesthetic restoration, Mandibular molar.

Introduction

The demand for aesthetic, strength, life lasting and easy-to-use dental restorative systems has led to the development of polymer-based dental composite materials [1,2]. At the present time, dental composites are widely used for filling the tooth cavities, veneering to mask discoloration, correcting contour, making dental implants and bonding orthodontic brackets [3,4]. Dental composite materials consist of a polymeric matrix and inorganic ceramic filler particles which are generally produced by light curing [5,6]. The polymeric matrix is flowable before curing, which makes the composite to fully penetrate into the tooth cavity [7,8]. During the curing procedure, the polymerization is activated, which allows the resin matrix to solidify and to change its mechanical properties rapidly and significantly [9,10]. Volumetric shrinkage also occurs in polymerization due to the decrease of intermolecular separations in the monomers of the polymeric matrix [11–13]. In the restorative systems where the restorations are

constrained along the interfaces, the polymerization shrinkage causes some shrinkage stresses in the composite and in the tooth [14–16]. In these cases, shrinkage stress may result in pulling the material away from the cavity walls which is the main reason for marginal debonding and then micro-leakage within the composite restorations [17,18]. Moreover, shrinkage forces on cusps produce cuspal deformation, enamel cracks and crazes which cause reduction in the fracture resistance of the cusp [19–21].

Shade selection plays an important role to achieve with a good aesthetic restoration that harmoniously blends to the natural dentition. Even though the colour may not be important to the physiological success of a dental restoration, it plays a dominant role in patient acceptance [22–25]. Patients are currently demanding esthetic replacement that must match their existing dentition, and are more concerned about the shade match of their restoration rather than the quality of the restoration. So chair side selection has become a very

important step in the overall treatment of the patient. Both visual and instrumental methods are used for shade selection with merits and demerits over each other. However, the visual method is still the most commonly used method due to relative simplicity and low cost [26–28].

One of the main concerns in the visual method is its highly subjective nature. Different individuals can have different shade perceptions for the same object. To achieve a good result, the four basic determinants are required [29–32].They are position, contour, texture and colour. The knowledge of the concept of colour is of great importance to achieve a good esthetics and its distribution of colour is very essential for dental shade matching. Colour combination will make the restoration look natural and attractive and also gives a good esthetic result. Color is a result of the interaction of three dimensions known as hue, chroma and value [33–35]. Hue denotes qualities that can be differentiated by colour words such as red, yellow, green, blue or purple. Chroma is a degree of saturation or the intensity of the hue such as light blue, dark blue and royal blue. Value describes the relative brightness of colours [36–38]. Visual colour matching is affected by many variables, such as age of the observer, his/her experience, possible colour deficiency, condition of the teeth observed and the light source. Factors influencing the tooth colour may include congenital, metabolic, chemical, genetic, infectious and environmental [39–41]. The shade and appearance of teeth is a heterogeneous phenomenon because many factors like opacity, translucency, light scattering, lighting conditions, gloss and the human eye and the brain influence the overall perception of the tooth colour [42,43]. To ensure accuracy, various shade selection protocols have been devised and thorough knowledge of these protocols is important so that visual shade selections can be carried out with accuracy and precision. Increasingly composite are placed in preference due to patients' demands for esthetics as well as the clinical desire to do minimal preparation where possible and provide patients with bonded esthetic restoration [44,45].

Our team has extensive knowledge and research experience that has translated into high quality publications [3,8,10,18,46–53]. The aim of the study is to find the prevalence of Common composite shades used for restoration of mandibular molar teeth.

Materials and Methods

Study Design and Setting

The retrospective study was conducted in a university hospital setting and the available data with similar ethnicity was collected from a particular geographic location. The trends in other locations were not assessed in this study setting. Ethical approval was given by the institutional ethical committee. The retrospective study was conducted in a university setting. Data was collected from the patients who visited Saveetha dental college between June 2019 to February 2021. Among 21,843 patients who had reported to the department of conservative and endodontics of Saveetha Dental College, prevalence of Common composite shades used for restoration of mandibular molar teeth were collected. From this data age, gender, type

of shade, tooth number, treatment was recorded. Case sheets were reviewed and cross verification was done by another examiner to avoid errors.

Statistical analysis

Data was recorded in Microsoft Excel (version 2007, office 365) and later exported to IBM SPSS (version 20.0 Chicago USA) and subjected to Statistical analysis. Chi Square test was then employed with a level of significance set at P<0.05. Chi square test was done to compare the parameters. The outcome was represented in a form of tables and bar charts.

Result and Discussion

It was noted that the most common age group to undergo treatment for composite restoration patients in the age group of 18-30 years (58.17%) (Figure 1) .The most prevalent gender to undergo this treatment were Male (56.45%) (Figure 2). Most common treatment underwent by patients were class 1 LCR (97.89%) (Figure 3). Most prevalent teeth to be treated was Tooth number 47 (25.52%) (Figure 4). Most common shade used was A2 (81.23%) (Figure 5). Correlation between the patient age and the shade used were statistically significant (p=0.000) (Figure 6) correlation between gender and the shade used were –statistically significant (p=0.000) (Figure 7). Correlation between treatment and shade used were -statistically significant (p=0.0000) (Figure 8). Correlation between the tooth number and the shade used-not statistically significant (p=0.037) (Figure 9).

Universal shade bulk fill resin-composite may represent a smart solution in color-matching if it blends with the adjacent tooth structure shade, beside its increased curing depth. This material is indicated for posterior fillings (classes I and II), not in anterior teeth (classes III and IV). In the latter case, the high translucency of this resin-composite would transmit the background color of the oral cavity [54]. The high level of difficulty faced can be due to the fact that shade selection is done visually and the visual method has several known disadvantages and inaccuracies. The deficiencies can be controlled by utilizing the instrumental method which provides scientifically accurate shade reading [7]. High tech gadgets like colorimeters and spectrophotometers are expensive and very difficult to operate in a clinical setup. This is the reason for the visual method to remain as the most commonly used method for tooth shade selection worldwide. In the study by Alruwaili, etal. [5] dental unit light was used more than the natural light to do shade selection. Studies by Sambandam, et al. [55] showed similar results to our study. Natural light was used more than the other sources of light. Northern daylight is considered a standard for judging good lighting. However, in everyday dental practice we can't rely on sunlight so color-corrected fluorescent lights with CRI of 90 or above are recommended. The use of incandescent bulbs and dental unit lights is not recommended because of a greater amount of light remittance [22].

Even in the study by Sambandham.et.al A2 shade was considered as the most commonly used shade. But in the study by Alruwaili, et al. [56] B1 shade was commonly used
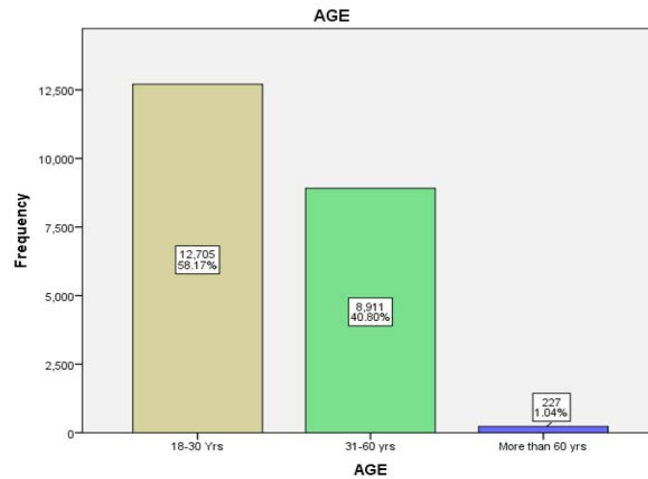
Figure 1. *Bar charts show the distribution of patients who underwent composite restoration treatment based on age (x- axis represents age group, y-axis represents number of patients) where grey indicates age group 18-30 years, green indicates 31-60 years, blue indicates more than years. The most common age group to undergo treatment for composite restoration were patients belonging the age group of 18-30 years.*
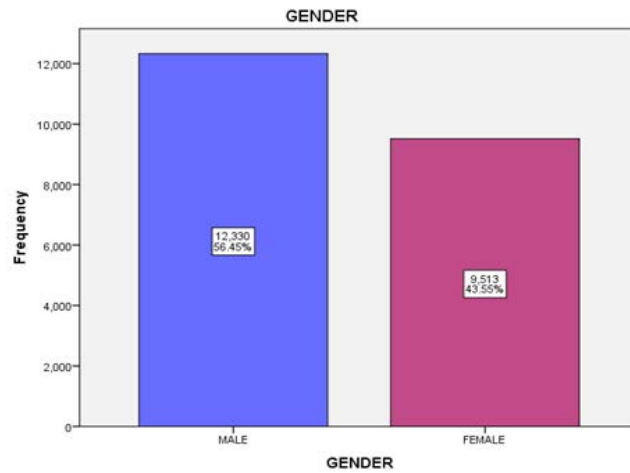

Figure 2. *Bar chart indicates the distribution of patients who underwent composite restoration treatment based on gender (X-axis represents gender, Y axis represents number of patients) where blue indicates male and purple indicates females. the gender which more commonly underwent composite restoration treatment were males compared to females.*
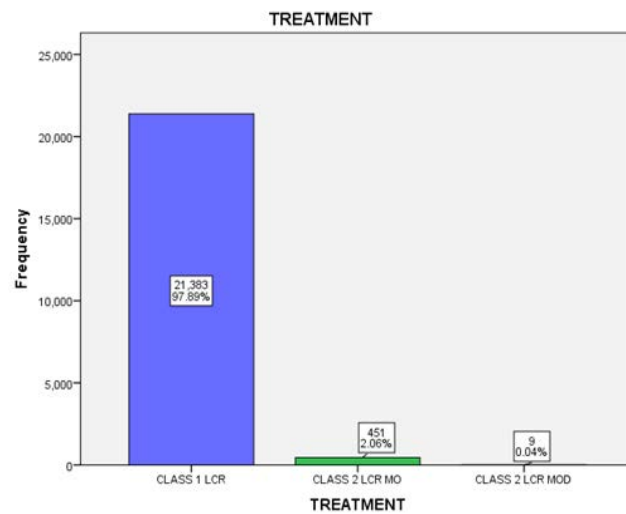

Figure 3. *Bar charts show the distribution of patients who underwent composite restoration treatment based on treatment (x- axis represents treatment , y-axis represents number of patients) where blue indicates class 1 LCR, green indicates class 2 LCR MO. The most common treatment undergone by patients was class 1 LCR.*
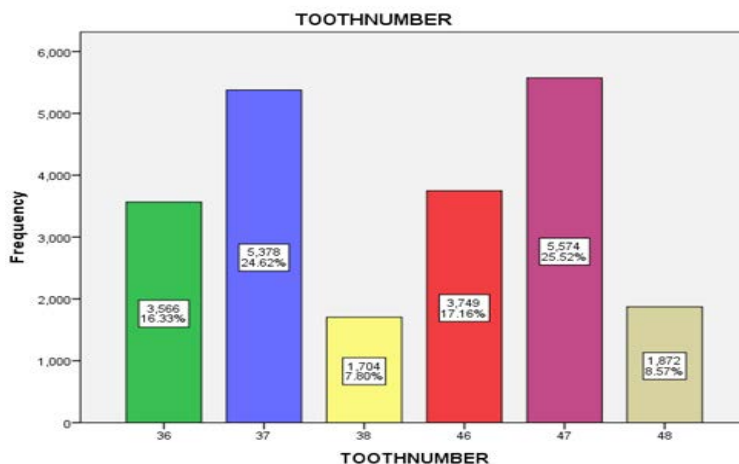
***Figure 4.** Bar charts show the distribution of patients who underwent composite restoration treatment based on tooth number (x- axis represents tooth number , y-axis represents number of patients) where grey indicates tooth number 36, blue indicates tooth number 37, yellow indicates tooth number 38, red indicates tooth number 46, purple indicates tooth number 47, grey indicates tooth number 48. The most commonly treated tooth were 47.*
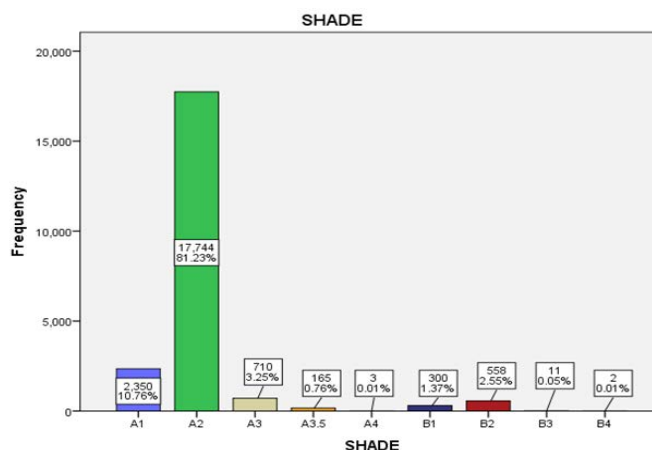

***Figure 5.** Bar charts show the distribution of patients who underwent composite restoration treatment based on composite shade (x- axis represents composite shade , y-axis represents number of patients) where blue indicates shade A1, green indicates shade A2, grey indicates shade A3, orange indicates shade A3.5, navy blue indicates shade B1, red indicates shade B2. The most commonly used shade was A2.*
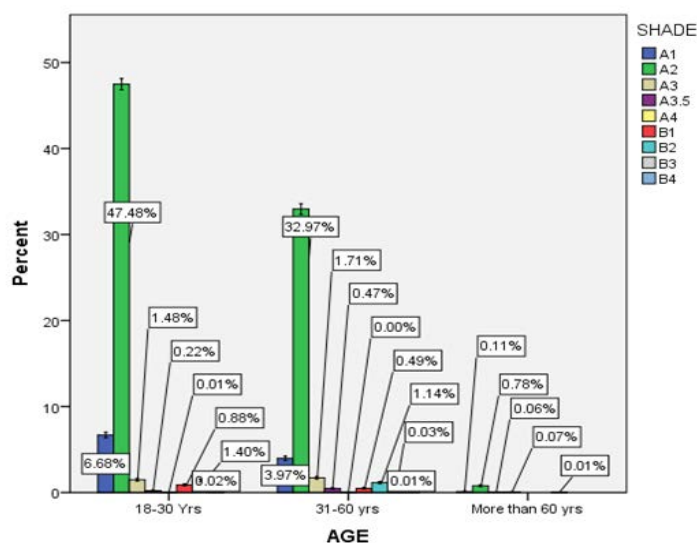

***Figure 6.** Bar chart shows the association between the shades present and age of the patients treated (X- axis represents the age, Y axis- frequency of distribution of shades used based on age) Among them A2 shade was used most commonly between age group of 18-30 yrs, Chi-square test was done and the association was found to be statistically significant. Pearson's value: 244.112, P-value: 0.000(<0.05), proving that there is an association present in the shade used and age of the patients who underwent treatment.*
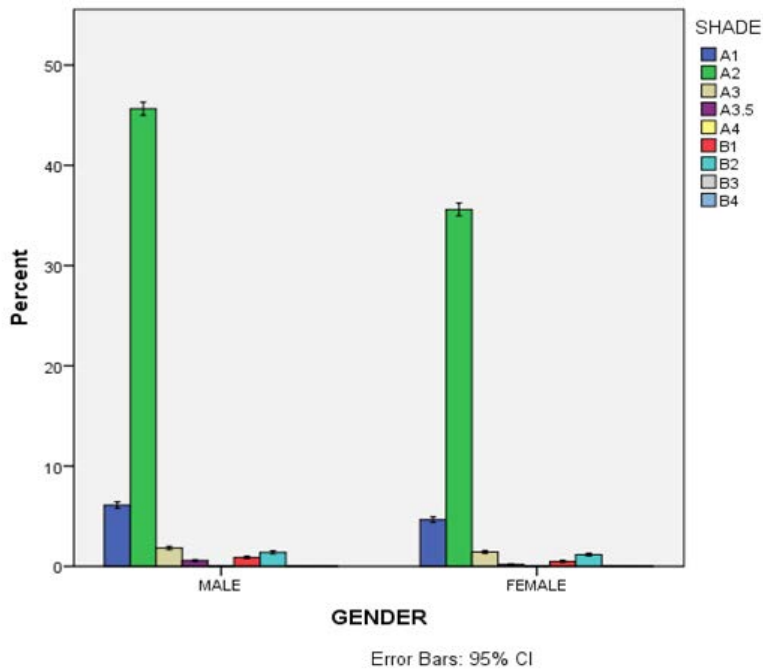
Figure 7. *Bar chart shows the association between the shades present and gender of patients treated (X- axis represents gender, Y axis represents the frequency of distribution of shades used based on gender). Among them A2 shade was used most commonly among males when compared to female. Chi-square test was done and the association was found to be statistically significant. Pearson's Chi-square value: 39.612, P-value: 0.000(<0.05), hence statistically significant, proving that there is an association present between the shade used and gender of the patients who underwent treatment.*
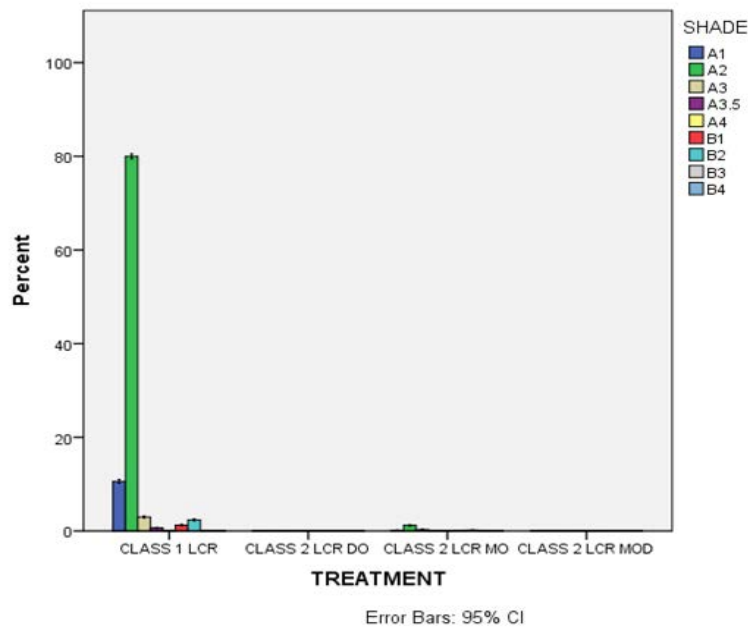

Figure 8. *Bar chart shows the association between the shades present and treatment (X- axis represents treatment, Y axis represents the frequency of distribution of shades used based on treatment). Among them A2 shade was used most commonly among class 1 LCR patients. Chi-square test was done and the association was found to be statistically significant. Pearsons's Chi-square value: 486.552, P-value: 0.000(<0.05), hence statistically significant, proving that there is an association present between the shade used and the treatment for the patients.*

in practice. The variation in the results may be to different geographical areas and a completely different population. Shade guides are said to have some disadvantages. To avoid all those mistakes, a new shade guide Vita 3D Master has been developed using Munsell's terminology. It utilizes the colour perception concept with five levels of values and three levels of chroma and hue and has been proved to be more accurate than the other theories [57,58].
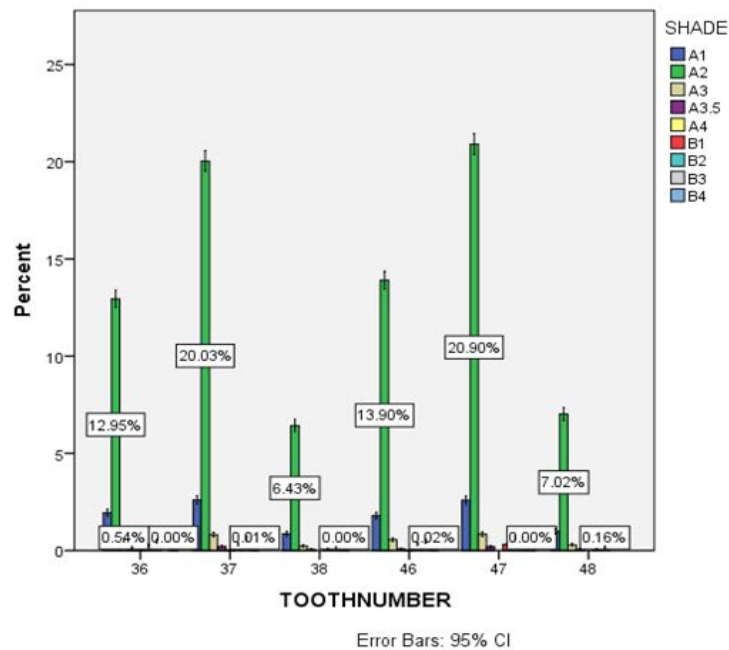
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Figure 9. *Bar chart shows the association between the composite shades and tooth number, where X- axis represents the tooth number, Y axis represents the frequency of distribution of shades based on tooth number). Pearsons's Chi-square value: 57.406, P-value: 0.037(>0.05), hence statistically not significant, proving that there is no association between the composite shades used and tooth number.*

Conclusion

Within the limitations of the study, it can be concluded the prevalence of Common composite shades used for restoration of mandibular molar teeth was most commonly seen in males than females. Significant association was present between the ages, gender with shade used.

Conflict of Interest

None to declare.

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J Clin Dentistry Oral Health 2023 Volume 7 Issue 1
8